# A new species of *Barbus* (Pisces, Cyprinidae) from Africa

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***Barbus amboseli*** sp. nov.

TYPICAL SERIES. Holotype (BMNH 1979.9.4:1), 35·5 mm SL; paratypes 23–45 mm SL BMNH 1979.9.4:2–6. All these specimens were caught in the Amboseli National Park, Kenya by R. Horowitz.

ETYMOLOGY. The specific name refers to the National Park, their only known locality, and is to be treated as a noun in apposition.

DESCRIPTION. The description is based on the six known specimens listed above. The abbreviations in the table below are explained at the end of the paper. Unless stated otherwise all measurements are expressed as a percentage of the standard length.

**Table 1**

| | | | | | | |
|---|---|---|---|---|---|---|
| SL (mm) | 35·5 | 45 | 35 | 33 | 25 | 23 |
| D | 29·6 | 27·8 | 30·0 | 31·8 | 30·0 | 26·1 |
| H | 28·2 | 28·9 | 28·6 | 28·8 | 30·0 | 30·4 |
| I | 7·0 | 6·7 | 5·7 | 6·0 | 6·0 | 6·5 |
| IO | 9·8 | 10·0 | 10·0 | 10·6 | 10·0 | 10·8 |
| MW | 5·6 | 5·5 | 4·9 | 6·0 | 6·0 | 5·4 |
| Pct | 19·7 | 21·1 | 21·4 | 18·2 | 18·0 | ? |
| Cpl | 19·7 | 25·6 | 21·4 | 22·7 | 24·0 | 21·7 |
| Cpd | 11·2 | 12·2 | 11·4 | 12·1 | 10·0 | 10·9 |
| Snt | 8·4 | 6·7 | 8·6 | 9·1 | 8·0 | 8·7 |
| Ab | + | 6·7 | + | ? | – | – |
| Pb | 5·6 | 7·8 | 7·2 | 6·6 | 6·0 | 5·4 |
| Dsp | 15·5 | 14·5 | 15·7 | 13·6 | 18·0 | 17·4 |
| Dfin | III–7 | III–7 | III–7 | III–7 | III–7 | III–7 |
| Pfin | I–15 | I–15 | I–15 | I–15 | ? | ? |
| Vfin | I–7 | I–7 | I–7 | I–7 | ? | ? |
| Afin | III–5 | III–5 | III–5 | III–5 | III–5 | III–5 |
| Cpsc | 10 | 10 | 10 | 10 | 8 | 10 |
| Ll | 20 | 19 | 20 | 20 | 20 | 20 |
| Tvl | $4\frac{1}{2}$–$4\frac{1}{2}$ | $4\frac{1}{2}$–$4\frac{1}{2}$ | $4\frac{1}{2}$–$4\frac{1}{2}$ | $4\frac{1}{2}$–$4\frac{1}{2}$ | ? | ? |

The overall shape of this stocky species can be seen in Fig. 1. The great majority of the meristic and morphometric characteristics do not differ significantly from those found in many other species of small *Barbus*. There are, however, two interesting exceptions to this conformity. Firstly, the lateral line scale count is unusually low (see above) and only the largest specimen has lateral line tubules; tubules are completely lacking in the others. Secondly, the anterior barbels appear to develop late. They are present in the largest specimen, incipient in the specimens of 35 and 35·5 mm SL but lacking in the three smallest specimens (Figs 2–4). A pharyngeal bone is shown in Fig. 5, the pharyngeal teeth number 5.3.1 (f.4) or 5.3.2. (f.1). There are 30 (f.2), 31 (f.3) or 32 (f.1) vertebrae excluding those comprising the Weberian mechanism but including $PU_1+U_1$. In all the specimens there are

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**Fig. 1** *Barbus amboseli* Holotype

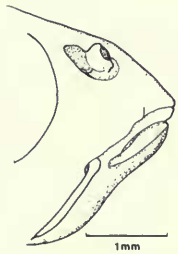


**Fig. 2** Head of the specimen of 23 mm SL. Note the absence of the anterior barbels.

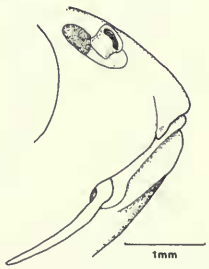


**Fig. 3** Head of the fish of 35 mm SL. Note incipient anterior barbels.

three unbranched dorsal fin rays, the posterior of which is strengthened and serrated on its posterior face. There are 3 (f.3) short, hooked gill rakers. The scales have widely-spaced radiating striae (Fig. 6).

The coloration in life is unknown, apart from a verbal comment by the collector that it was 'unremarkable'. Formalin-fixed and alcohol-preserved specimens are brown ventrally and darker brown dorsally. Immediately behind the operculum there is a diffuse dark spot which, after three scales, forms a very narrow clearly defined mid-lateral stripe. One dark spot surrounds the insertion of the unbranched dorsal fin rays, another dark spot is present at the termination of the mid-lateral stripe. There is a slight concentration of pigment cells


**Fig. 4** Head of the largest fish, 45 mm SL. The anterior barbels are well developed.

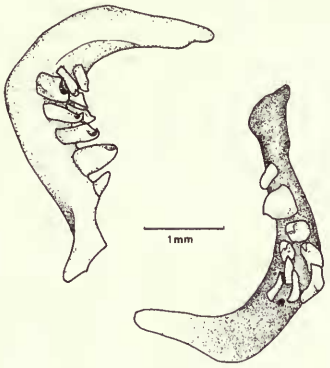


**Fig. 5** Two views of the left pharyngeal bone of the largest fish.

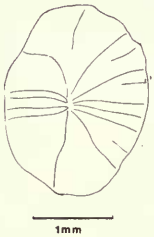


**Fig. 6** The third scale from the 'lateral line series' of the holotype to show the striations.

around the insertion of the unbranched anal fin rays. The edges of the flank scales are darker than the centres.

The dorsal fin, anal fin and caudal peduncle spots are more clearly demarcated in the smaller specimens. In the largest specimens, the proximal parts of the dorsal fin rays are more pigmented, especially those of the last simple ray.

DISTRIBUTION. This species is known only from the type locality, the east side of the Encongo swamp, south of the causeway, Amboseli National Park, Kenya. The waterway was described by the collector as a stream with alternating riffles and papyrus-lined pools, 2–5 feet wide and 1–3 feet deep. The Amboseli area is a region of internal drainage, the lowest part, in wet years, forming the shallow, saline Lake Amboseli.

DIAGNOSIS AND AFFINITIES. The combination of a serrated dorsal spine, low lateral line count, complete absence or full complement of tubules on the lateral line scales, a 5.3.1. pharyngeal tooth pattern and the late development of the anterior barbels is unique among the small *Barbus* of east and central Africa.

Throughout Africa, very few species have as few scales as *Barbus amboseli. Barbus jae* from Cameroons has 20–23 scales in the lateral line series (*fide* Boulenger, 1911); *B. pumilis*

Blgr from the White Nile has 19–21 (*fide* Boulenger, 1911); *B. chiumbeensis* Pellegrin from Angola has 17–22 (*fide* Poll, 1967). Although *Barbus gribinguensis* Pellegrin was described as possessing 18–22 scales (see e.g. Poll & Lambert, 1961) it has now been shown that Pellegrin erred in his counts (Blache, 1964:120). *Barbus gribinguensis* is now considered to be conspecific with *Barbus pleuropholis* and has 21–23 scales in the lateral line series.

The complete absence of lateral line tubules in all the sample except the largest *Barbus amboseli* is a puzzling phenomenon that immediately invites two possibilities. Firstly, their development could be delayed. Should this be the valid explanation then it would be a most unusual event. Lateral line tubules normally develop along with scales formation in African *Barbus* species (personal observations.). For example, in *Barbus neumayeri* from east Africa scales become distinguishable between 10 and 20 mm SL. Tubules are detectable in the better formed lateral line scales at less than 20 mm SL and the full complement of tubules is conspicuous at 22 mm SL (personal observations.).

Another possibility is that *Barbus amboseli* is unusually variable in the degree of tubule development. Various other species of small *Barbus* from Africa have only a few lateral line tubules, the exact number of which varies. Of the species with a low lateral line count listed above, *Barbus jae* for example, most frequently has only two or three tubules but it is not rare to find specimens in which they are wanting. In *Barbus pumilis* only the first few scales of the lateral line are perforated. Although reduction in the number of lateral line tubules is a derived character, its presence in the species listed above does not imply that they form a monophyletic group. Rather, it seems that the character has been acquired independantly. *Barbus pumilis,* for example, has been considered by some authors (e.g. Poll & Lambert 1961) to belong to the sub-genus *Clypeobarbus* because of its conspicuously deep lateral line scales and its smooth, flexible dorsal fin 'spine'. Also, neither *Barbus pumilis* nor *Barbus jae* have barbels. Amongst others, a similar reduction in lateral line tubules occurs in the strikingly marked, large scaled and sexually dimorphic *Barbus papilio* and its relatives from Zaire (Banister & Bailey, 1979). Again, this group of species is not advocated as close relatives of *Barbus amboseli.* The only obvious common factor in all the species showing reduction in the lateral line tubules is that they are small species, and all have a low number of lateral line scales. However, the correlation is far from perfect because the dull, but sexually dimorphic, species *Barbus haasianus* from southern Africa has 35–38 'lateral line' scales yet lacks the tubules (Jubb, 1967); whereas *Barbus chiumbeensis* has all 17–22 lateral line scales perforated (Poll, 1967).

A serrated dorsal fin spine occurs in approximately a third of the African *Barbus* species. It is impossible, at the moment, to know whether or not the type of dorsal fin spine can be used as an indicator of relationship. Most African *Barbus* species can be divided into three groups on the basis of their type of dorsal fin spine (Boulenger, 1911). The spines can be ossified and smooth, ossified and serrated or unossified, smooth and flexible. The difficulties inherent in the use of these characters to establish phylogenetic relationships are a) our inability to determine which (if any) of the three states is derived (or, indeed, primitive), b) the fact that some apparently valid species have more than one state [e.g. *Barbus miolepis fide* Poll & Lambert 1964 and *Barbus issenensis fide* Almaca 1970 (now regarded as *Barbus capito* by Karaman 1971)] and c) the apparent incompatability of classification by spine type with classification by size i.e. into the 'big' and 'small' *Barbus* species, or by the type of scale striations (parallel or radiate).

Which, if any, of these three commonly used schemes will result in a phylogenetic classification is unknown and great caution should be exercised in adopting one scheme in preference to another.

The commonest configuration of pharyngeal teeth among African *Barbus* is 5.3.2 (inner to outer rows). Reduction from the 5.3.2 pattern (which, on the principle of commonality is the plesiomorph condition) is known in a few species; mostly the 'smaller' ones (Banister, 1973 and personal observation.). The commonest form of reduction in the smaller species is to lose the first tooth of the inner row resulting in a 4.3.2. pattern (Banister & Bailey, 1979 and personal observation.). As far as I know the 5.3.1 pattern present in most of the *Barbus*

*amboseli* specimens is unique among the 'small' *Barbus* of Africa, although it reflects the general trend towards reduction in pharyngeal tooth number in the smallest species. The actual loss of the tooth is probably a physical response to the increasing diminution in size.

The late development of the anterior barbel presents an intriguing problem. The number of barbels has achieved a great significance in the classification of *Barbus* species, some authors having given separate generic status to species with respectively 0, 2 or 4 barbels (e.g. Schultz, 1957). Increasing awareness of the considerable variability shown by many species has, therefore, inevitably caused doubts about the usefulness of barbels as characters above the species level. Even at the specific level, great care must be exercised in using barbel characteristics as diagnostic features. *Barbus anoplus* Weber, from South Africa, has populations with only the posterior pair of barbels, populations with four barbels and populations in which the females have only the posterior pair whilst the males develop the anterior pair as well (Jubb, 1967). In an apparently closely related species, *B. motebensis* Steindachner the anterior pair of barbels may or may not be present. Parenthetically, it should be noted that in both these species the number of lateral line tubules is also very variable (Jubb, 1967), although it is not known if this phenomenon can be linked with barbel development *Barbus brevipinnis* Jubb has populations with 2 or 4 barbels. *Barbus brevipinnis,* and to a lesser extent *Barbus motebensis,* have restricted ranges and Jubb (1967:91) has noted that there is often more variability in localised species. In contrast, however, *Barbus anoplus* is widespread.

There was no particular significance in the selection of these examples, they were chosen at random from the literature to illustrate barbel variability. *Barbus amboseli* has an apparently limited distribution which, following Jubb's (1967) comment, might indicate that a great variability is likely. But the only possible significantly variable feature in the regrettably small sample is in barbel number. It has proved impossible to determine the sex of the specimens so the presence of the anterior barbels cannot be shown to be a sex-limited feature as in some populations of *B. anoplus.* Perhaps more usefully, though, a clinal explanation can be rejected because all the specimens came from the same site. Unless a larger sample becomes available I cannot elaborate on the statement that *Barbus amboseli* is unique in that the development of the anterior pair of barbels is a correlate of size and hence age.

The relationships of *Barbus amboseli* are presently unknowable because, within a cladistic framework, its diagnostic features are of no significance.

## Acknowledgements

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## Key to the abbreviations

| | |
|---|---|
| Ab | Length of the anterior barbel |
| A fin | Number of rays in the anal fin |
| BMNH | Register number in the British Museum (Natural History) |
| Cpd | Least depth of the caudal peduncle |
| Cpl | Length of the caudal peduncle |
| Cpsc | Number of scales around the least circumference of the caudal peduncle |
| D | Greatest depth of the body |
| D fin | Number of rays in the dorsal fin |
| Dsp | Length of the last unbranched ray of the dorsal fin |
| H | Head length from the tip of the snout to the extremity of the opercular bone |
| I | Horizontal diameter of the eye |
| Ll | Number of scales in the lateral line series (or the equivalent series in the specimens lacking the tubules) |
| MW | Greatest width of the mouth |
| Pb | Length of the posterior barbel |
| Pct | Greatest length of the pectoral fin |
| P fin | Number of rays in the pectoral fin |
| SL | Standard Length |
| Snt | Length of the snout from its tip to the anterior border of the orbit |
| Tvl | Number of scales in transverse series from the origin of the dorsal fin to the lateral line and thence to the mid-ventral line |
| + | Character present but not measurable |
| – | Character absent |
| ? | Uncountable or unmeasurable because of size or damage |

All measurements were taken with dial calipers.

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